



COMMUNITY WELLHEAD PROTECTION PLAN FOR PUBLIC WATER SYSTEMS IN DOUGLAS COUNTY, NEVADA

January 2012

PREPARED BY:

**The Douglas County
Community Wellhead Protection Team**

**Carson Water Subconservancy District
Douglas County Community Development
Douglas County Geographic Information
System
Douglas County Planning Commission
Douglas County Public Works
Douglas County School District
Gardnerville Water Company
Indian Hills General Improvement District
Johnny's Roadhouse
Nevada Division of Environmental Protection
Nevada Rural Water Association**

**Pinion Pines Mobile Home Park
Sierra Country Estates
Sierra Estates General Improvement District
Topaz Lake Water Company
Topaz Lodge
Topaz Ranch Estates General Improvement
District
Town of Gardnerville
Town of Minden
University of Nevada Cooperative Extension
Washoe Tribe of NV and CA**

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ACKNOWLEDGEMENTS

The Douglas County Community Wellhead Protection Team wishes to acknowledge the technical assistance provided by various members of the United States Geological Survey, facility meeting accommodations provided by the Town of Minden, and funding/technical assistance for plan development from the Nevada Division of Environmental Protection.

Finally, the Team would like to recognize representatives from the following organizations that made development of this document possible from its conceptualization through countless hours of Team meeting participation, sub-team participation, document preparation, document review and comment:

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ACRONYMS

AB – Assembly Bill

AFR – Arbitrary Fixed Radius

AIRS – Aerometric Information Retrieval System

AMSL – Above Mean Sea Level

AST – Aboveground Storage Tank

BCA – Bureau of Corrective Actions

BGS – Below Ground Surface

BOCC – Board of County Commissioners

BRS – Biennial Reporting System

BSDW – Bureau of Safe Drinking Water

BWPC – Bureau of Water Pollution Control

C – Community (Public Water System)

CERCLIS – Comprehensive Environmental Response, Compensation, and Liability Information System

CFR – Calculated Fixed Radius

CSI – Contaminant Source Inventory

CWHP – Community Wellhead Protection

- CWHP Plan – Community Wellhead Protection Plan
- CWHP Team – Community Wellhead Protection Team

ECHO – Enforcement & Compliance History Online

EFFPD – East Fork Fire and Paramedic District

EPA – United States Environmental Protection Agency

FAQs – Frequently Asked Questions

FOA – Funding Opportunity Announcement

GID – General Improvement District

GIS – Geographic Information System

GPM – Gallons Per Minute

GPS – Global Positioning System

HHW – Household Hazardous Waste

ISWPP – Integrated Source Water Protection Program
LUST – Leaking Underground Storage Tank
MHP – Mobile Home Park
MYA – Million Years Ago
NAC – Nevada Administrative Code
NC – Non-community (Public Water System)
NDEP – Nevada Division of Environmental Protection
NDWR – Nevada Division of Water Resources
NEPA – National Environmental Policy Act
NOAA – National Oceanic and Atmospheric Administration
NRS – Nevada Revised Statutes
NSBDC – Nevada Small Business Development Center
NTNC – Non-Transient Non-Community (Public Water System)
PCS – Potential Contaminant Source
PWS – Public Water System
RCRA – Resource Conservation and Recovery Act
SDWIS – Safe Drinking Water Information System
SWAP – Source Water Assessment Program
SWPA – Source Water Protection Area
TOT – Time of Travel
TRI – Toxic Release Inventory
UNLV – University of Nevada, Las Vegas
USDA – United States Department of Agriculture
USGS – United States Geological Survey
UST – Underground Storage Tank
VAP – Vulnerability Assessment Program
VOC – Volatile Organic Compound
WHP – Wellhead Protection
WHPA – Wellhead Protection Area

EXECUTIVE SUMMARY

On August 6, 2009, the Douglas County Board of County Commissioners (BOCC) approved participation in the State of Nevada's Integrated Source Water Protection Program (ISWPP), a voluntary program undertaken to prevent the pollution of community drinking water sources, including ground water, lakes, rivers, springs, and streams. The Douglas County Community Wellhead Protection (CWHP) Plan has been prepared, under the guidance of the ISWPP, to provide a framework for the long-term protection of public drinking water supply sources (consisting mainly of ground water) across Douglas County.

The Douglas County CWHP Plan includes public water systems (PWSs) throughout the Carson Valley, Holbrook Junction, and Topaz areas (maps are provided for reference in Appendix A). For the purposes of this Plan, the term "Community" collectively refers to the PWSs, residents, and local governments located within these three areas of Douglas County. Since PWSs located in the Lake Tahoe Watershed are already protected by stringent water quality regulations specific to that area, they are not addressed in this Plan.

The Douglas County CWHP Team (Team) responsible for creating this document was primarily composed of representatives from the various PWSs within Douglas County and from local and state government. The Team met on numerous occasions to develop this CWHP Plan, and summary notes from each of these meetings is provided in Appendix B. Additionally, the United States Geological Survey (USGS) provided the invaluable technical expertise of several of its representatives in an advisory capacity. The Team's mission was to review existing conditions around each of the public drinking water sources to determine if they were adequately protected from potential sources of contamination or if additional measures to manage these critical water supplies were necessary. The mission was successfully accomplished and is documented in this report.

The goal of this CWHP Plan is to ensure a clean drinking water supply for future generations, to reduce the risk to human health by ensuring the communities of Douglas County have an uninterrupted supply of uncontaminated drinking water, and to provide for future cooperation and coordination between PWSs and the state and county government. Historically, some land use has resulted in the contamination of wells or other drinking water sources and the subsequent loss of those sources. Such losses are not only expensive, but are frequently preventable. Simply stated, the goal is to protect drinking water from contamination sources through education and the management of land uses around or near drinking water sources.

A PWS is defined by Nevada Revised Statutes (NRS) as any system which regularly serves 25 customers or more, or has 15 or more connections. Thus wells, such as those used for individual households, do not meet the definition of a PWS and are not included for evaluation in the CWHP Plan. Within the Douglas County Community, there are currently 26 PWSs (reference Appendix C for PWS Inventory information). There were 81 ground water wells and one spring associated with the 26 PWSs studied. Of the 81 wells reviewed, 60 were active, 11 were inactive (but for the purposes of the CWHP Plan were considered potential backup wells), six were abandoned, and four were formally designated as backup wells.

A wellhead protection area (WHPA) was established around each of the identified PWS drinking water sources by using available site-specific ground water data. The WHPA is the area on the ground surface which must be managed in order to protect the ground water below. The outlined area is the result of complex ground water modeling and delineates the above ground land surface where various human

activities can contribute to pollution or contamination of an underground well or spring water supply. Information relevant to the WHPA delineation approach for each system is provided in Appendix D.

The modeled capture zones created some uncertainties for the technical sub-team, specifically whether or not the areas were conservative enough, and reflected on the ground conditions enough, to provide the best protection of the Community's drinking water sources. To address this concern, the Team modified the capture zones by extending the WHPAs to include a 0.1 mile "buffer" and incorporating adjacent commercially or industrially zoned areas. The team agreed to use this approach for existing, as well as newly modeled WHPAs. The exception to this method was the WHPAs in the Gardnerville Ranchos General Improvement District (GID) services area, as the Gardnerville Ranchos General Improvement District declined participation in the CWHP Plan development process.

The WHPAs have been plotted on a series of maps (provided in Appendix A) to facilitate their use by County residents, land use planners, and water system operators. County residents may want to use these maps to determine the source of their drinking water supply. County residents can also use the information provided in the CWHP Plan to take active steps to improve the quality of the Carson and Antelope Valleys' ground water.

A survey was undertaken to document potential contamination sources within, or in the vicinity of, the WHPAs for each water source. Specific information relevant to this contaminant source inventory (CSI) is provided in Appendix E. Two hundred seven potential contaminant sources (PCSs) were identified near the PWSs in Douglas County; the majority of which were either residential (septic systems) or automotive (auto repair shops, gas stations, etc.). The WHPAs identified during the field survey appeared to be adequately protected. However, based on the results of the contaminant source survey, the CWHP Team developed a strategy to proactively manage PCSs in the community and a schedule for implementing this strategy in the future. As new projects are proposed and processed through the Plan review procedure, information about each project located within a WHPA will be forwarded for review and comment by the operator of the PWS associated with that WHPA. PWS operator comments will be compiled by the Planning Department and included in the Conditions of Approval for the project. The Douglas County Planning Commission and the BOCC review, approve, or deny projects as required by Title 20, the Douglas County Master Plan, and NRS as applicable. Additionally, where practicable and when financially feasible, areas with high concentrations of septic tanks will be converted to sewer systems with associated wastewater treatment plants. The Work Plan for Community Wellhead Protection Plan Implementation is included in Appendix F.

The Contingency Plans for PWSs with State-endorsed wellhead protection (WHP) plans are referenced in the CWHP Plan and contain reviews of potential contaminant scenarios and measures to address possible contamination either through treatment or the development of a new water source. Information in the Contingency Plan can include, but is not limited to, an emergency contact list, a description of possible primary contingencies and emergencies, short and long-term water treatment options, emergency and long-term drinking water replacement sources, and a cost/benefit analysis for possible actions.

The East Fork Fire and Paramedic District (EFFPD) also maintains a County-wide Contingency Plan that details emergency response and planning measures to safeguard the drinking water supply or, if necessary, remediate or replace the water supply components, in support of PWS-established contingency plans and emergency response needs during emergency situations.

The CWHP Plan should be revisited on a regular basis to ensure its continued success. The community may later identify new sources of contamination, not originally considered in the Plan, or experience an event that changes the characteristics of the community's water supply. Regular updates will ensure the CWHP Plan incorporates significant and/or future changes within the community. Templates to assist in future updates to the CWHP Plan are provided in Appendix G.

The Public Education Plan is located in Appendix H and is an organized and strategic approach to educating residents and encouraging them to take action to protect their water resources. "Action" refers to changing practices and behaviors which could be detrimental to drinking water sources and to obtaining feedback on land uses from the PWS operators charged with managing their systems to promote projects compatible with the goals outlined in the Douglas County CWHP Plan. The objective of the Public Education Plan is to present water providers, residents, and other stakeholders with a set of tools and tactics to promote source water protection outreach and education. The Public Education Plan is organized into three main components: messages, tactics, and measurement techniques. It is aimed at two different audiences: community members who are public water users and local sixth-grade students.

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SECTION 1: INTRODUCTION

1.1 Overview

The Douglas County Community Wellhead Protection (CWHP) Plan is divided into the following sections:

- **Section 1** presents the participants, the background, and purpose of this CWHP Plan.
- **Section 2** describes the formation and activities completed by the CWHP Team (Team) to develop the CWHP Plan.
- **Section 3** discusses the CWHP Plan development and includes mutually developed and adopted protocols for protecting public drinking water sources/supplies.
- **Section 4** describes the means to implement this CWHP Plan and establishes a schedule for updating and maintaining the CWHP Plan.
- **Section 5** presents the Public Education Plan that is the foundation for a successful and sustainable CWHP Plan.

1.2 Background

Public water systems (PWSs) throughout Douglas County, Nevada, have voluntarily participated in the development of this comprehensive and coordinated CWHP Plan in order to protect their drinking water resources and thereby ensure a high quality, sustainable water supply for their communities. The Douglas County CWHP Plan includes PWSs throughout the Carson Valley, Holbrook Junction, and Topaz areas. For purposes of this Plan, the term “Community” collectively refers to the PWSs, residents and local governments located within these three areas of Douglas County. Since PWSs located in the Lake Tahoe Watershed are already protected by stringent water quality regulations specific to that area, they will not be addressed in this Plan.

A PWS is defined by Nevada Revised Statutes (NRS) 445A.235 as any system which regularly serves 25 customers or more or has 15 or more connections. The 26 PWSs located in the Carson Valley, Holbrook Junction, and Topaz areas of Douglas County are listed in Table 1 (page 3). The Nevada Bureau of Safe Drinking Water (BSDW) classifies PWSs according to the following definitions:

- **Community Water System (C)** – *“Community water system” means a public water system that has at least 15 service connections used by year-round residents of the area served by the system or regularly serves at least 25 year-round residents of the area served by the system (NRS 445A.808).* Examples of Cs include mobile home parks (MHPs) or municipal water systems operated by a county or town.
- **Non-community Water System (NC)** – *“Non-community water system” means a public water system that is not a community water system (NRS 445A.828).* Examples of NCs include restaurants and service stations.

- Non-transient non-community Water System (NTNC) – “*Non-transient water system*” means a non-community water system that regularly serves at least 25 of the same persons for more than 6 months per year (NRS 445A.829). Examples of NTNCs include schools and factories.

The CWHP Plan was developed by the Community to protect its drinking water resources from contamination, manage land use in high risk areas, and provide education regarding the reasons for the Plan and its continued development. Of the PWSs listed in Table 1 (page 3), five had established wellhead protection (WHP) plans prior to the development of this CWHP Plan. This CWHP Plan is intended to provide a broader, community-wide perspective, building upon the pertinent information and results from the previous plans completed by individual PWSs and communities.

Development of this Plan is based on the guidance document entitled *Nevada Integrated Source Water Protection Program* (ISWPP), which was prepared by the Nevada Division of Environmental Protection (NDEP) in February 2010 as an update to the State Wellhead Protection Program developed in 1994. The guidance document sets the framework for local plan development and outlines the criteria required for a CWHP plan to receive State endorsement. With a State-endorsed plan, the local Community may be eligible to receive additional technical assistance from NDEP to continue implementing the management strategies outlined in the CWHP Plan. The CWHP Plan has been developed with the intention of achieving State endorsement. Furthermore, since the Douglas County Community is one of the first in Nevada to develop a comprehensive plan, it may serve as a model for establishing community-wide source water (wellhead) protection programs throughout the State.

1.3 Purpose

The purpose of the CWHP Plan is to document the development of strategies intended to provide comprehensive and collaborative protection of the Community’s public drinking water sources following the framework of the ISWPP. By following the ISWPP, the Community has developed a coordinated approach, with the support of local governments and stakeholders, to protect both individual water sources as well as areas where water resources cross jurisdictional boundaries. As system interties continue to be developed and PWSs in Douglas County are connected together, the CWHP Plan will provide a tool to facilitate cooperation between water purveyors to aid in the management and continued safety of the Community’s water resources.

Community Wellhead Protection Plan for
Public Water Systems in Douglas County, Nevada
January 2012

Table 1. Public Water Systems within the Carson Valley, Holbrook Junction, and Topaz Areas

Public Water System	Type	Class	Previous WHP Plan
East Valley Water System	Residential	C	Douglas County Community Development Wellhead Protection Program, January 2008
West Valley Water System	Residential	C	
North County Water System	Other non-transient	NTNC	
South Valley Water System	Recreation, Residential	C	
Foothill Water System	Other area	C	
China Springs Youth Camp	Institution	NTNC	
Lampe Park	Recreation	NC	
Topaz Park	Recreation	NC	
Gardnerville Ranchos General Improvement District (GID)	Residential	C	Wellhead Protection Report for Gardnerville Ranchos General Improvement District, December 1997
Gardnerville Water Company	Industrial/Agricultural, Residential	C	Gardnerville Water Company Wellhead Protection Plan, July 2004
Indian Hills GID	Residential	C	Indian Hills General Improvement District Well Head Protection Program Final Report, July 2002
Town of Minden	Industrial/Agricultural, Residential	C	Town of Minden Wellhead Protection Plan, July 2004
Holbrook Station RV and MHP	MHP, Recreation, Restaurant	C	None
Johnny's Roadhouse	Restaurant	NC	None
La Ferme Restaurant	Restaurant	NC	None
Mountain View MHP	MHP, Residential	C	None
Pinion Pines MHP	MHP	C	None
Riverview MHP	MHP	C	None
S and J Ventures, dba Junction Bar	Restaurant	NC	None
Seven Eleven No. 23074	Service	NC	None
Sierra Country Estates	Residential	C	None
Sierra Estates GID	Residential	C	None
Topaz Lake Water Company	Hotel/Motel, Residential	C	None
Topaz Ranch Estates GID	Residential	C	None
Topaz Summit Spring	Other transient	NC	None
Williams Ridge Tech Park	Industrial/Agricultural	NTNC	None

1.4 Location and Description

A vicinity map of Douglas County is presented in Figure 1 (page 6). PWSs in Douglas County can be found in both the Carson and Antelope Valleys. The majority of the systems are located in the Carson Valley, including those associated with the towns of Genoa, Minden and Gardnerville; Gardnerville Ranchos and Indian Hills GIDs, and Douglas County Utilities. The Antelope Valley contains the communities of Topaz and Holbrook Junction. The Carson Valley spans approximately 420 square miles (1,087.8 square kilometers) in the central portion of the County and is bounded on the west by the Carson Range of the Sierra Nevada Mountain Range and by the Pine Nut Mountains on the east. The Carson Valley is drained by the Carson River, which flows northward through the valley. Antelope Valley is located in the southeast portion of the County and is approximately 110 square miles (284.9 square kilometers) in area. Antelope Valley is drained by the West Walker River which traverses northeast through the valley. Figure 1 corresponds to the maps, provided in Appendix A, of the PWS well locations, associated wellhead protection areas (WHPAs), and potential contaminant sources (PCSs) within the WHPAs. PCSs are discussed further in Section 3.3 of this CWHP Plan.

According to the United States Census Bureau, Douglas County has experienced significant population growth from an estimated 41,259 residents in 2000 to 46,997 residents in 2010. PWSs located in the Carson Valley, Holbrook Junction, and Topaz areas serve approximately 34,240 of these residents according to current NDEP records. Since the majority of the County's population is served by PWSs in these areas, continued protection of the Community's potable water supply will ensure the long-term health and sustainability of the Community.

1.5 Coordination with Other Community Plans

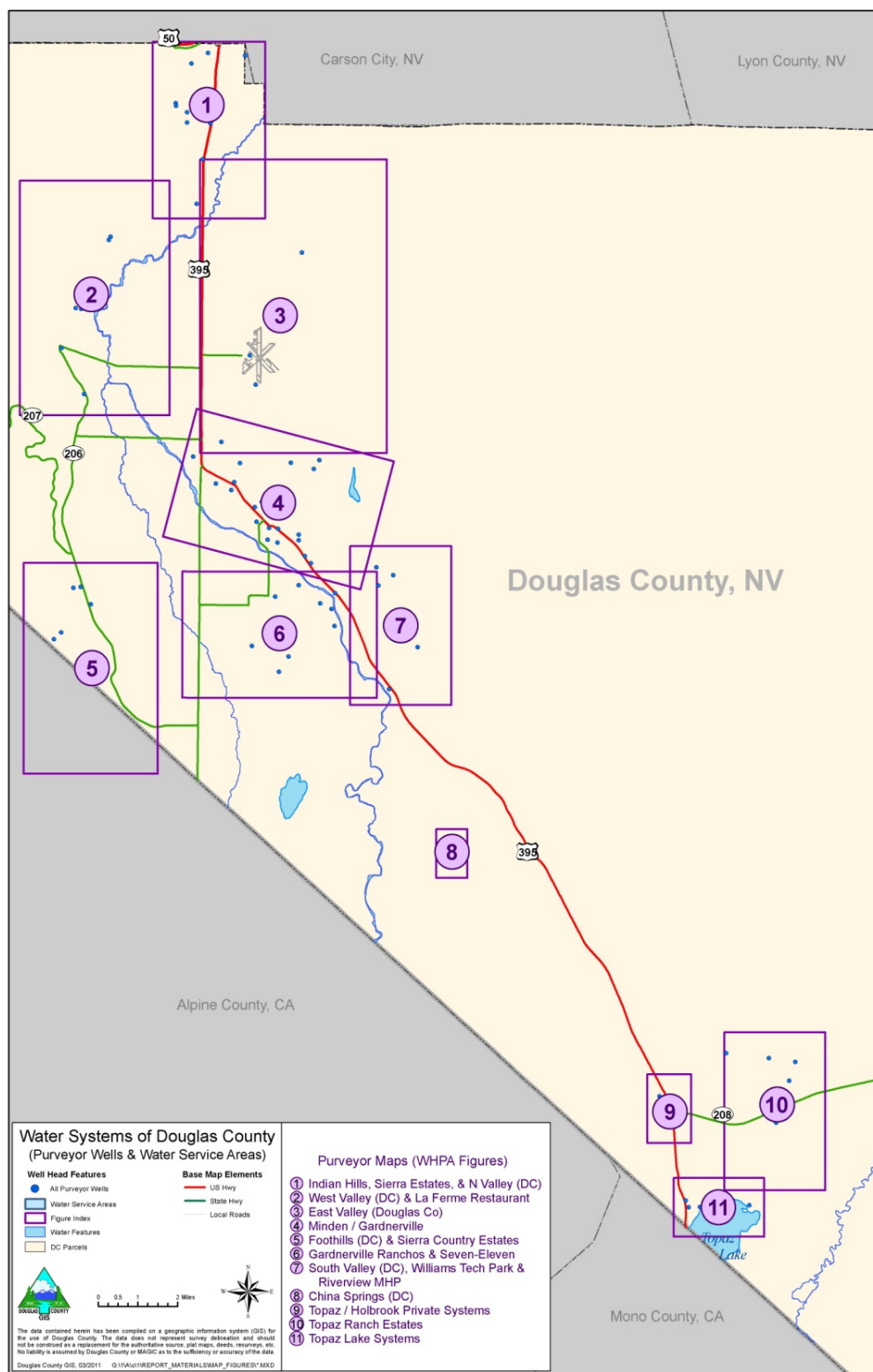
The CWHP Plan has been developed in coordination with existing Community documents, including the Douglas County Master Plan 2006 Update. The CWHP Plan is proposed for incorporation into the Douglas County Master Plan 2011 Update. Information pertaining to maps, WHPAs, and PCSs is available in electronic format through the Douglas County Planning and Geographic Information System (GIS) Departments. The WHPAs proposed in the CWHP Plan incorporate adjacent or overlapping areas designated as commercially or industrially zoned. The technical sub-team expressed concerns with the modeled capture zones, specifically whether or not the areas were conservative enough and were an accurate reflection of on the ground conditions to provide the best protection of the communities' drinking water sources. To address this concern, the Team modified the capture zones by extending the WHPAs to include a 0.1 mile "buffer" and incorporating adjacent commercially or industrially zoned areas. The team agreed to use this approach for both existing as well as newly modeled WHPAs. Information corresponding to the Planning Areas and Community Areas established in the Douglas County Master Plan Update can be used in conjunction with the WHPAs established in this CWHP Plan so the County planners and the affected PWS operators can readily compare the location of sensitive potable water protection areas with existing or proposed projects within the WHPAs. This comparison process is useful for implementing proactive planning measures that protect the quality of Douglas County's drinking water supply.

The Contingency Plans for PWSs with State-endorsed systems are referenced in the CWHP Plan and contain reviews of potential contaminant scenarios and measures to address possible contamination either through treatment or the development of a new water source. Information in the Contingency Plan can include, but is not limited to, an emergency contact list, a description of possible primary contingencies and emergencies, short and long-term water treatment options, emergency and long-term drinking water

replacement sources, and a cost/benefit analysis for possible actions. Douglas County Public Works has conducted Vulnerability Assessments on each system in the relevant contingency and emergency planning sections of previously prepared and state-endorsed WHP plans.

The East Fork Fire and Paramedic Districts (EFFPD) were recently assigned responsibility by the Douglas County Board of County Commissioners (BOCC), to prepare and maintain emergency planning documents for the County. The Douglas County Emergency Response Plan, which includes the County's Hazard Mitigation Plan, was authorized in 2008 by the BOCC and was prepared prior to the EFFPD assuming responsibility for preparation of this document. The current Hazard Mitigation Plan addresses mainly natural disasters but is proposed for amendment by the EFFPD to include other infrastructure issues, including the PWSs within the County. Thus, the information in this CWHP Plan will be shared with EFFPD to incorporate relevant information into the amended Douglas County Emergency Response Plan.

Figure 1. Vicinity Map



SECTION 2: TEAM FORMATION

In order to begin the initial process, representative stakeholders throughout the Community participated in a series of meetings that culminated in a workshop. Workshop participants identified Team members responsible for developing and implementing the CWHP Plan. Subsequent sections document the series of events leading to the formation of the Team and Sub Teams and summarize their activities.

2.1 Request to Participate in the Nevada Integrated Source Water Protection Program

On August 6, 2009, an NDEP representative presented the ISWPP opportunity to the BOCC. The NDEP representative explained the purpose and benefits of the ISWPP, including how the CWHP Plan works to protect the Community's potable water sources. She also highlighted the benefits to PWSs within Douglas County. The BOCC agreed to participate in the ISWPP, submitted a letter to NDEP requesting participation in the program, and directed staff to support the development of the CWHP Plan. Copies of the BOCC agenda, meeting minutes, and letter to NDEP are provided in Appendix B.

2.2 Pre-Workshop

A pre-workshop meeting was conducted with Douglas County staff on March 8, 2010, to review the proposed workshop agenda and the list of invited entities. Preferred format, date, and venue for the workshop were also selected. Copies of the pre-workshop agenda and minutes are included in Appendix B.

2.3 Workshop

On April 7, 2010, NDEP hosted a public workshop in Minden, Nevada, at the CVIC Hall. The purpose of the workshop was to introduce the ISWPP to Community stakeholders, provide an overview of the water resources within Douglas County, identify the Community's goals and objectives for protecting their potable water sources, and nominate members for the CWHP Team. Attendees suggested Team meetings should be held on the first Wednesday of each month in order to minimize potential conflicts with other regularly scheduled meetings of the local government entities. The workshop agenda and meeting summary are included in Appendix B.

2.4 Community Wellhead Protection Team Meetings

Team meetings were held on the dates listed below in order to develop the CWHP Plan:

- | | |
|--------------------|---------------------|
| • May 5, 2010 | • January 5, 2011 |
| • June 2, 2010 | • April 6, 2011 |
| • July 7, 2010 | • June 1, 2011 |
| • October 6, 2010 | • September 7, 2011 |
| • December 1, 2010 | • October 5, 2011 |

At the initial meetings of the Team, members were nominated for specific roles and the structure of the Team was established to include Sub Teams responsible for developing specific elements of the CWHP Plan. Sub Team meetings were held as follows:

- July 19, 2010 – Technical Support and Mapping Sub Team meeting to discuss geologic description and delineation sections and finalized table of current water sources and conditions.
- September 1, 2010 – Conceptual Model review with Technical Support and Mapping Sub Team.
- December 1- 3, 2010 – Modeling Information Exchange with the Technical Support and Mapping Sub Team.
- June 23, 2011 – Technical Support and Mapping Sub Team meeting to review the Minden and Gardnerville WHPA delineation methodology by incorporating commercially and industrially zoned areas into adjacent WHPAs.
- July 8, 2011 – Technical and Mapping Sub Team meeting to discuss revising the approach for delineating WHPAs for all of the PWSs in the County. The new approach entailed using the modeled or otherwise delineated WHPAs, incorporating a 0.1-mile buffer to the ten-year time of travel (TOT) capture zone, and expanding the ten-year TOT zone to include adjacent industrially or commercially zoned areas.

Team members included representatives for Douglas County, the Town of Minden, and the Town of Gardnerville. Table 2 summarizes the roles of Team members and Team structure.

Table 2. Community Wellhead Protection Team Members

Lead	Cathe Pool, Douglas County Public Works
Secretary	Eileen Church, Douglas County Public Works
Plan Development and Review Sub Team	Cathe Pool, Douglas County Public Works (Lead) Roger Van Alyne, Town of Minden Kim Borgzinner, NDEP Kathleen Johnson/Eileen Christensen, BEC Environmental, Inc.
Education and Outreach Sub Team	Steve Lewis, Nevada Cooperative Extension (Lead) Leigh Luce, Douglas County School District Judie Fisher, Sierra Estates GID
Technical Support and Mapping Sub Team	Eric Schmidt, Douglas County GIS (Co-Lead) Tim Russell, Resource Concepts, Inc., consultant to Town of Minden and Indian Hills GID (Co-Lead) Chad Foster, Douglas County GIS Tom Dallaire, Town of Gardnerville Ed James, Carson Water Subconservancy District Michael Rosen, United States Geological Survey (USGS)*
Government Liaison Sub Team	Mimi Moss, Douglas County Community Development Carl Ruschmeyer, Douglas County Public Works Margaret Pross, Douglas County Planning Commission

**Note: Michael Rosen served solely as technical advisor to the Team; he did not approve or vote on Team decisions, nor did he provide direction to the Team.*

The Team approved Community goals and objectives to develop the CWHP Plan at the first Team meeting. Subsequent meetings focused on addressing each element required by the ISWPP. Whenever possible, multiple elements were addressed simultaneously during the Team meetings until the five ISWPP elements were addressed. At each opportunity, the Team provided direction on how the CWHP Plan should be developed and implemented. Copies of agendas and minutes from each Team meeting are

provided in Appendix B. Sub Team meetings were held on an as needed basis to address specific elements of the CWHP Plan. NDEP worked closely with the Community, providing technical assistance to the Team as necessary.

2.5 Community Goals and Objectives

The Team identified the following goals and objectives for protecting their drinking water supplies:

- I. Goal 1:** Create an integrated Plan based on the needs of each PWS.
 - a. **Objective:** Solicit participation from as many water systems as possible and define their respective roles.
 - b. **Objective:** Clearly delineate each system's existing service area.
 - c. **Objective:** Coordinate Plan development between GIDs, political entities, and water system operators.
 - d. **Objective:** Incorporate WHPAs in the design review process prior to development.
 - e. **Objective:** Prepare a list of goals for the CWHP Plan that can be submitted for review, consideration, and buy-in by stakeholder Boards.
- II. Goal 2:** Successfully implement the integrated Plan.
 - a. **Objective:** Obtain additional information and continually improve data quality for PCSs and WHPA maps. Distinguish between natural and man-made contaminant sources. Prevent long term source contaminant issues.
 - b. **Objective:** Establish a risk ranking system to prioritize protection of water supply wells.
 - c. **Objective:** Consider regulatory management options, such as ordinances and impact fees.
 - d. **Objective:** Create an outreach program to educate business owners and the public about the interaction of different water systems, communication between surface and ground water, the extent of the hydrographic basin into Alpine County, California, risks associated with wide-spread septic use, and water conservation and best management practices during construction.
 - e. **Objective:** Develop a CWHP Plan that identifies funding opportunities for specific projects.

SECTION 3: PLAN DEVELOPMENT

3.1 Water Supply Source Inventory and Planning

PWS sources in the Douglas County Community have been summarized in Appendix C. Ground water serves as the principal drinking water supply for these systems. However, drinking water

originates from many sources, including ground water, surface water, and springs. The evolution and development of these water supplies is reviewed in subsequent sections.

3.1.1 Historical Water Sources and Conditions

Initial settlement took place in Douglas County in 1851, when a small Mormon trading post was opened in what is now the town of Genoa. The early economy was almost entirely based on trade, until 1859 when the Comstock Lode was discovered to the north, in Virginia City. This sudden boom in mining created a vast demand for lumber, and Douglas County's economy became enmeshed in the clear cutting timber industry. By the end of the mining boom in 1874, the Carson Range surrounding Lake Tahoe had been completely denuded of forests. With no more forests and a reduced demand for lumber, the local economic driver shifted to agriculture, specifically the growing of alfalfa for livestock. Land was brought into production through the use of gravity fed irrigation ditches. Mining interests began moving into the County near the turn of the twentieth century, with several gold placer mines and at least one large body of copper ore.

Following the 1960s, there was a rapid rise in population as well as new development in the Carson Valley, primarily in single family land use. Because there was no coinciding increase in central wastewater disposal, many residents relied on septic tanks, which significantly increased in density into the present.

Since the 1970's, new septic tanks have been installed at a rate of 1,000 per decade and now total over 4,500 in the region. This has resulted in elevated nitrate concentrations in several areas across the valley, including the Ruhenstroth and Johnson Lane areas (Jacobson, 2010).

3.1.2 Current Water Sources and Conditions

Within the Douglas County Community, there are currently 26 PWSs. Of these, 16 are classified as community systems (Cs), six are classified as non-community systems (NCs), and the remaining four are non-transient non-community systems (NTNCs). All of the studied PWSs (with the exception of Topaz Summit Springs) relied exclusively on wells as their source of drinking water, with a total of 81 wells. Of these, 11 PWSs consist of only one well. Of the remaining systems, four have two sources (this includes one backup well or an inactive well that may be used as backup), and the remaining ten systems have three or more sources. This information is summarized in Appendix C. Of the 81 wells reviewed, 60 were active, 11 were inactive (but for the purposes of this Plan were considered potential backup wells), 6 were abandoned, and 4 were formally designated as backup wells.

Twelve of the active PWSs in Douglas County have prepared previous WHP plans endorsed by NDEP. The status of each source (active, backup, etc.) and pumping rates referenced from these endorsed plans have been summarized in Appendix C. According to the previous WHP Plan for these PWSs, there were no documented concerns regarding the overall quality of the ground water supplying each system. However, arsenic concentrations in excess of United States Environmental Protection Agency (EPA) maximum concentration levels prompted interties among several PWSs to improve drinking water quality.

Many PWS within Douglas County did not develop WHP Plans for a variety of reasons, mainly associated with lack of resources to request assistance from NDEP to begin the process, and/or

lack of personnel to actively participate in the WHP Plan development process. Individual WHP plans did not typically consider neighboring systems mainly due to resource and funding limitations in addition to the historical program approach, which consisted of a PWS focus rather than community wide focus. The new approach to drinking water protection through the ISWPP allows communities to pool resources and coordinate management strategies for multiple PWSs across town boundaries. In Douglas County, this new approach was particularly valuable because several systems were and are in the process of interconnecting system operations.

3.1.3 System Descriptions

Descriptions of the basic location, clientele and components of major PWSs in Douglas County follow. PWSs have been separated into categories based on their ownership status; County owned, publicly owned or privately held.

3.1.3.1 County-Owned Water Systems

East Valley Water System

The East Valley water system serves as a backup water supply for the Mountain View and Johnson Lane residential communities, the Minden/Tahoe Airport and the Johnson Lane, Heybourne Road and Airport Road commercial/industrial areas. The system comprises the North Clapham, Airport, and South Airport wells. Storage is currently provided by a pair of 1.5 million gallon water storage tanks, a 600,000 gallon water storage tank, and one 500,000 gallon water storage tank, but the main water supply for this service area draws from the combined Minden/Gardnerville system through the Minden Intertie.

West Valley Water System

The West Valley water system currently serves Genoa Lakes, Sierra Shadows, Walley's Hot Springs Resort, Eagle Ridge, portions of the Town of Genoa and the Montana subdivision. Water supply is provided by two infiltration wells adjacent to Sierra Canyon Creek, and two active and one backup ground water wells near the Walley's Hot Springs Resort and the Montana subdivision. Storage is currently provided by a 410,000 gallon water storage tank, a 500,000 gallon water storage tank, a 450,000 gallon water storage tank utilizing booster pumps and fire drivers, and a one million gallon water storage tank.

North County Water System

The North County water system currently serves the commercial and retail centers along Topsy Lane and US 395. The water system currently consists of two wells and two 1 million gallon water storage tanks. An emergency interconnection has been provided between Indian Hills GID and the North County water system to provide a backup and redundant water supply. Construction is underway to develop an interconnection with the Town of Minden. The system was also interconnected to Sierra Estates GID as an emergency backup.

South Valley Water System

The South Valley water system in the Ruhenstroth Planning community currently serves the Douglas County Fairgrounds, Ruhenstroth fire station, transfer station and animal control facility. The water system currently consists of one production well, one backup well, one emergency backup well and a 200,000 gallon water storage tank. This PWS consists of the combined Fairgrounds and Sunrise Estates systems.

Foothill Water System

The Foothill water system currently serves the Sheridan Acres and Jobs Peak service areas. The systems have been interconnected to develop a regional system along Foothill Road. The Foothill water system currently consists of three wells which are currently in production, a 550,000 gallon water storage tank, a 250,000 gallon water storage tank, and a 66,000 gallon water storage tank. Two wells from this system (the Sheridan Old Well and the former Job's Peak Well #2) were recently abandoned.

China Springs Water System

The China Springs water system serves only the China Springs Youth Camp and expansion to serve other communities is not anticipated. The water system consists of a 240,000 gallon water storage tank, a production well, and one irrigation well/back-up well. The domestic water supply is treated to remove iron and manganese.

Lampe and Topaz Parks Water Systems

The Douglas County Parks and Recreation Department operates two water systems serving County facilities in Lampe and Topaz Park. Lampe Park serves a multi-use park and County office facility in Gardnerville. The water system consists of one well, a booster pump and a pressure tank. The Topaz Lake Park serves a ranger station and campsite, similarly consisting of one well, a booster pump and a single pressure tank.

3.1.3.2 Publicly-Owned Water Systems

Gardnerville Ranchos GID Public Water System

The Gardnerville Ranchos GID PWS serves both residential and commercial customers in the Gardnerville Ranchos Planning Community. The Gardnerville Ranchos GID was invited to participate, but declined participation in the CWWP Planning process. As such, the information presented herein is current only as of the last update of their WHP Plan published in 1997. For additional information relevant to wellhead protection planning for this community, the Gardnerville Ranchos GID should be contacted directly, as the information provided herein may not be accurate.

The Team welcomes future participation from the Gardnerville Ranchos GID and other stakeholder entities in future updates and amendments to the Douglas County CWWP Plan.

Indian Hills GID Public Water System

The Indian Hills GID PWS serves residential, commercial, and other customers in the Indian Hills/Jacks Valley Planning Community. The Ridgeview water system, previously owned and operated by Douglas County, has been consolidated into the Indian Hills GID water system. The system contains 12 wells; however, only seven wells and two booster stations are currently active. A network of six storage tanks exists for the system, including one 100,000 gallon water storage tank, two 188,000 gallon water storage tanks, two 420,000 gallon water storage tanks and one 600,000 gallon water storage tank.

Town of Minden Public Water System

The Town of Minden PWS consists of seven wells. Storage for the PWS consists of only one 250,000 gallon water storage tank and a 6,000 gallon hydropneumatic tank located near wells 1

and 2. An intertie has recently been developed between the Town of Minden and the Gardnerville Water Company, which allows the two systems to share storage and capacity in an emergency.

Sierra Estates GID Public Water System

This system is located in the Indian Hills/Jacks Valley Planning Community and consists of one well located within the Eagle Valley ground water basin. The District maintains a single 60,000 gallon water storage tank and is connected to the North County Water System through a single intertie as an emergency backup.

Topaz Ranch Estates GID Public Water System

This system serves a portion of Topaz Ranch Estates residential area. The system consists of five wells, one of which is currently inactive, an additional well that is pending construction, and no storage facilities.

3.1.3.3 Privately-Owned Water Systems

Gardnerville Town Water Company Water System

The Gardnerville Town Water Company is a non-profit entity owned by the residents of Gardnerville. It serves residential and commercial interests within the town. The water system contains seven wells and storage consists of small pressure tanks on location at wells #1, 2, 3, 4, and 6, in addition to a 1.5 million gallon water storage tank and a 2.6 million gallon water storage tank located off Virginia Ranch Road.

Old Sawmill Industrial Park Water System

This system presently serves the Aervoe-Pacific buildings at the Old Sawmill Industrial Park in the East Valley Planning Community and consists of one well and a 225,000 gallon water storage tank.

Additional Private Water Systems

Several additional privately owned water systems exist in Douglas County, which will not be described here but can be found in Table 1 (page 3) and in Appendix C. These systems are typically small, providing services to a single business or community, and operate only one or more low volume wells connected to a distribution system with minimal storage capacity; but, because they have more than 15 connections and/or service more than 25 customers, they are regulated as PWSs. The privately owned water systems include: Holbrook Station RV and MHP, Johnny's Roadhouse LLC, La Ferme Restaurant, Mountain View MHP, Pinion Pines MHP, Riverview MHP, S and J Ventures - dba Junction Bar, Seven Eleven No. 23074, Sierra Country Estates, Topaz Lake Water Co. Inc., and Topaz Summit Spring.

3.1.4 Future Water Sources and Conditions

Prior to the development of the Team approach for ground water protection throughout Douglas County, there were five independent, NDEP-approved, WHP Plans in force:

- Douglas County Community Development WHP Program (2008)
- Gardnerville Ranchos General Improvement District WHP Program (1997)
- Gardnerville Water Company WHP Plan (2004)

- Indian Hills General Improvement District WHP Program (2002)
- Town of Minden WHP Plan (2004)

Each report indicated water supplies were currently sufficient in quantity and quality, but additional water may be needed in the future due to expected community growth. However, the EPA compliance deadline for its new arsenic standard (revising the drinking water standard from 50 parts per billion to 10 parts per billion) became effective on January 23, 2006, subsequent to finalization of these reports. The new arsenic standard prompted the need for an intertie project to connect water systems for the Town of Minden, East Valley, Indian Hills, North County, and Carson City. The intertie projects were subsequently completed, and plans to connect the South Valley Water System in the future are dependent on funding.

Any new wells for individual systems or those incorporated into the intertie projects need to abide by the guidance set forth in the plans, and a preemptive PCS Survey would need to be conducted to assist in well siting. New wells are proposed for construction for: the Indian Hills system (the well has not yet been sited, but is proposed to draw from the same aquifer as the current primary water source, Brown's Well); the West Valley area at Hollister; and in the Old Sawmill location at the Williams Ridge Tech Park.

3.2 Source Water Protection and Delineation

In order to update the information and results presented in the previous WHP Plans and establish a source water protection program for PWSs for which a WHP Plan had not previously been prepared, a comprehensive review of pertinent geologic, hydrogeologic, and water supply data for the PWSs within the Douglas County Community was completed. This information is detailed in the Delineation Summary Report in Appendix D, and an illustration of how the Carson Valley hydrologic system works is provided as Figure 2 (page 16).

Source Water Protection Areas (SWPAs) are comprised of the land surface surrounding and area beneath a water supply source (ground water, surface water, or spring) in which activities and land uses must be managed in order to protect the water supply. WHPAs are those that specifically surround a well and are a subset of SWPAs. The protection area is generally represented on the land surface as a circular or elliptical shape around the water supply source. The areas are typically computer generated models that outline the anticipated distance traveled by a particle of water entering the water supply over a fixed period of time (Time of Travel or TOT). SWPAs are prepared to allow communities to plan for and respond to situations in which contamination occurs.

The Technical Team worked to delineate the boundaries around each well, based on a computer generated analytical model, thereby creating WHPAs that designated three main TOTs. The TOTs were estimated at two, five and ten years. For example, this means that (theoretically) contaminants entering the aquifer in the five year TOT region of the WHPA are estimated to take between five and ten years to reach the well or water source and could contaminate the drinking water. Figure 3 (page 17) provides a conceptual drawing of the WHPA for a well. The updated and newly established protective areas for the current drinking water sources supplying PWSs throughout the Douglas County Community are presented in Appendix A.

The shapes of the WHPAs for different wells or between different systems can vary widely, depending on the model used and the specific hydrogeologic characteristics associated with the area. The Arbitrary

Fixed Radius (AFR) method has been chosen for the proposed Sawmill Well, described in the Minden-Gardnerville map, mainly because there is insufficient information to use another modeling method approved by NDEP. The AFR establishes a circle with a specified radius around the well; the distance of the radius is based on established set back requirements for specific contaminant sources from ground water wells. NDEP uses a 3,000-foot fixed radius as a minimum for all SWPAs at the State level in performing vulnerability surveys around existing public water supply wells. NDEP also utilizes the 3,000-foot fixed radius for consideration in various permitting activities and to meet contaminant survey requirements for the development of new public drinking water wells funded through NDEP grant and loan programs.

The Calculated Fixed Radius (CFR) method is typically used when minimal information is available and uses a simple mathematical relationship between pumping rate, aquifer porosity, length of well screen and TOT to establish a radius around the well. These radii represent the estimated maximum time required for contaminants to reach the well in question. An example of this method can be observed at the 7-Eleven Convenience Store well. A modified version of this method, that incorporates local surface water considerations, was also chosen for the Topaz Park well.

Analytical modeling requires the most geological and hydrologic information and is the preferred method for WHPA delineation due to its relative accuracy in reflecting ground water and contaminant movement through the subsurface. Variations of shapes developed using this method can be attributed mainly to the modeling program used, and sub-surface geologic and surface water influences. Examples of these variations can be seen in viewing the Minden-Gardnerville wells. Additional information relevant to analytical modeling and the other modeling methods described above is provided in Appendix D.

Figure 2. Conceptual Illustration of the Carson Valley Hydrologic System

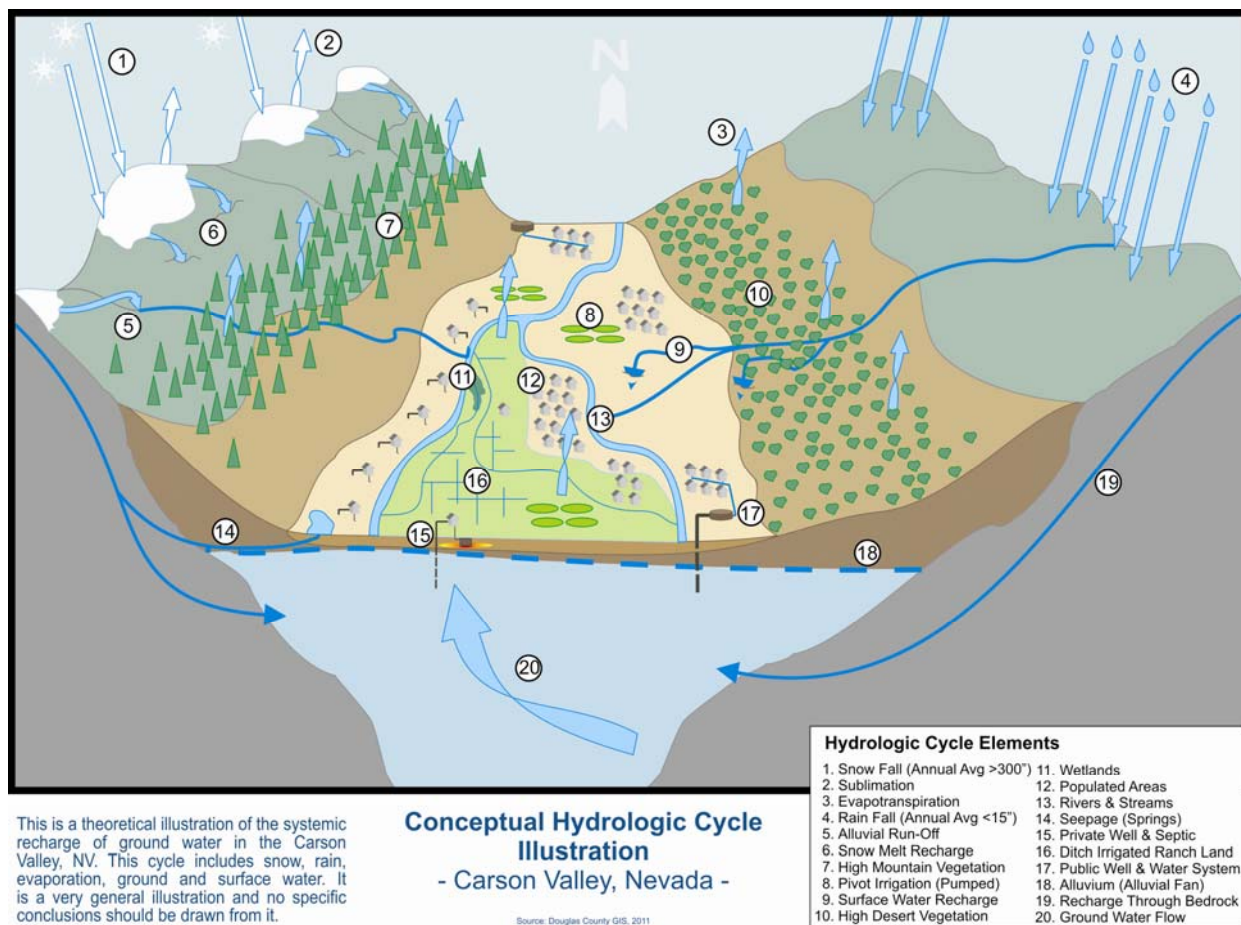
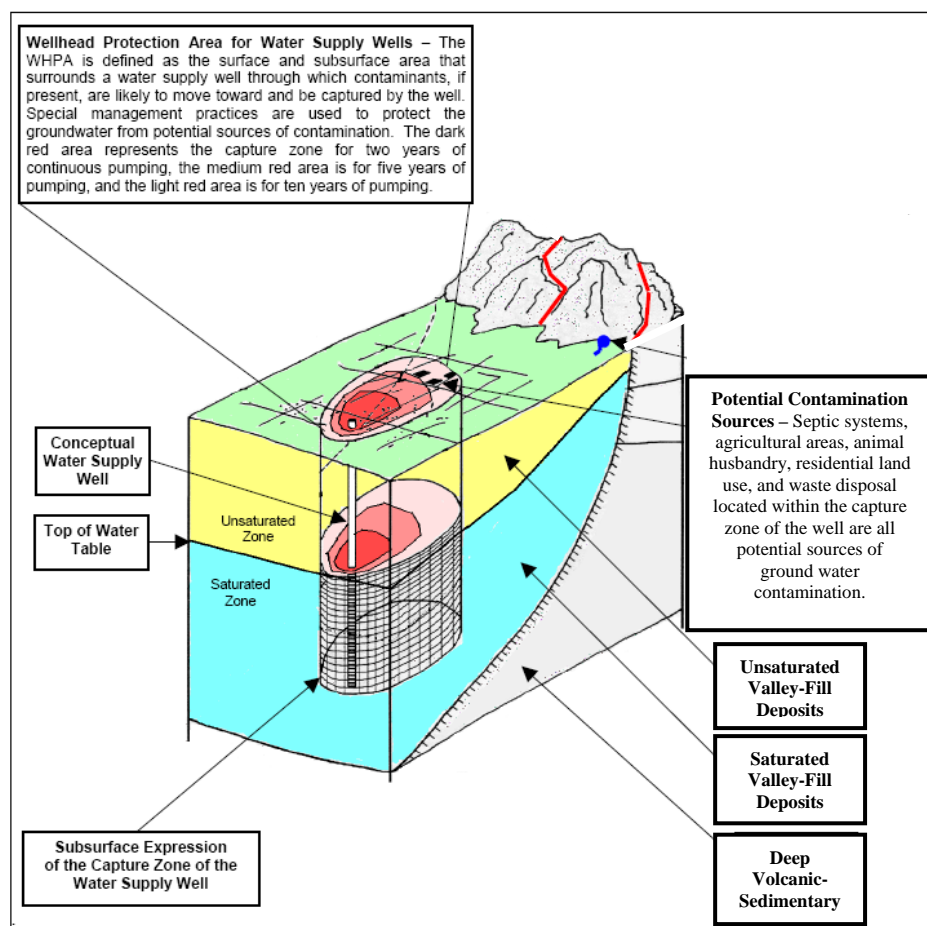


Figure 3. Conceptual Drawing of the Wellhead Protection Areas for the Douglas County Water Supply Sources (modified from Nevada Bureau of Water Quality Planning Guidance Document, 2000)



3.3 Contaminant Source Inventory

A PCS inventory is performed to identify potential hazards to the quality of a community's drinking water supply. The contaminant source inventory (CSI) conducted in Douglas County assisted the Team in obtaining basic information used in designing management tools to prevent future contamination. Although the contaminant sources observed during field surveys indicated the WHPAs appeared to be adequately protected, there were specific instances of PCSs that could adversely affect drinking water quality for these areas in the future. For example, the high density of septic tanks in the vicinity of the Fairgrounds Well and other locations throughout the Carson Valley prompted the Team to include conversion from septic to sewage systems, as practicable, as a management approach for related organic, inorganic and microbiological contamination. Many types of industry, businesses, land uses, and activities may have an impact on ground water quality (as indicated by active NDEP Bureau of Corrective Actions case files near the airport and at the Old Saw Mill Industrial Park), so the Team recommended local business owner education programs, particularly for existing businesses located within WHPAs.

Appendix E provides the methodology used to develop the PCS inventory and a table with the detailed CSI information available as of publication of this CWHP Plan. However, the initial review of the table indicated the majority of PCSs were residential in nature (septic systems) and accounted for 37 percent of the PCSs inventoried. Other PCSs located within the PWS WHPAs included gas stations, automotive shops and underground storage tanks (USTs) (approximately 27 percent of all PCSs); agricultural-related facilities, including irrigation ditches and golf courses/parks/nurseries comprised approximately 13 percent; industrial manufacturers and commercial enterprise such as photographers, paint shops, and dry cleaners, each made up approximately 4 percent (8 percent total); existing public ground water wells made up another 8 percent of PCSs; and the remaining medical, educational, and municipal facilities comprised the last 7 percent of PCSs inventoried.

Of the 26 systems surveyed, 25 were found to have at least one PCS, with some areas, such as the South Valley Water System, containing as many as 32 separate PCSs. This is because the Carson Valley contains regions of relatively high population density without central utilities, resulting in an abundance of septic systems within the WHPAs. This is the case in the South Valley, Indian Hills, Sierra Country Estates and Sierra Estates GID water systems.

PCSs are numbered within the WHPAs depicted on the maps in Appendix A. The numbers on these maps correspond to the code for the contaminant source listed in Table 1 located in Appendix E.

3.3.1 Desktop Research

A review of the WHPAs versus PCS locations was performed by the CWHP Team as part of the CSI. This process entailed a desktop review of existing regulatory databases, previously endorsed WHP Plans, NDEP Source Water Assessment Program (SWAP) files, and information leveraged from other NDEP field activities. The University of Nevada, Las Vegas (UNLV) conducted a field survey of PCSs in Douglas County as part of NDEP's SWAP/Vulnerability Assessment Program (VAP) in 2010. In the UNLV study, surveys were conducted using a 3,000 foot perimeter around each well, analogous to a WHPA created using the AFR methodology. Additionally, NDEP provided UNLV with select WHPAs that extended beyond the 3,000-foot radius and asked UNLV to include PCSs within the WHPA and beyond the 3,000-foot radius. While many of the same PCSs appear in both the Team and UNLV's studies, the different WHPA criteria utilized produced different results (i.e. PCSs that were within the 3,000-foot radius, but outside of the WHPA). Both studies showed a prevalence of PCSs from septic tank and automotive sources; however, the AFR methodology of the UNLV study identified several PCSs outside of the WHPAs that were surveyed within the scope of work for the CWHP Plan. Additional detail regarding the inventory process and specific findings are provided in Appendix E, and the location of PCSs is provided in the figures in Appendix A.

3.3.2 Field Surveys

Field surveys were conducted on April 6 and 7, 2011, in order to supplement the data from the UNLV study and other desktop research. Surveys utilized handheld global positioning system (GPS) receivers (Garmin GPS eTrex Vista HcX) to ensure accuracy and to identify PCSs within WHPAs in Douglas County. GPS data points were cross-referenced against known locations using GIS software (ArcGIS Version 10, Build 2800) to provide reasonable data quality verification.

3.3.3 Risk Rankings

The WHPAs managed by Douglas County contain numerous potential sources of contamination. In addition, areas and features adjacent to, and in some cases up-gradient of these WHPAs also contain potential sources of contamination. For this reason, PCSs are addressed by category, rather than individually. Discussed below are the five most significant categories of PCSs in Douglas County; however, a complete list of all PCSs has been included in Appendix E.

In general, the highest risk for contamination for the majority of the PWSs in Carson and Antelope Valleys, including Sierra Estates GID, Indian Hills, Genoa Lakes, Montana, La Ferme, East Valley's North Clapham well, the Foothills, Job's Peak, Gardnerville Ranchos GID, Sierra Country Estates, South Valley and Topaz Ranch Estates, is associated with residential septic tanks. Risks associated with automotive repair shops and USTs appeared to be most prevalent in the Gardnerville Water Company, Town of Minden, Topaz Ranch Estates-Holbrook, and Topaz Lake Water Service Areas. East Valley PWS PCSs were mainly associated with operations at the airport. Above-ground storage tanks and aviation/automotive repair and maintenance activities were prevalent in the immediate vicinity of both airport wells.

3.3.3.1 Auto Repair Shops

Automotive repair shops are the most common PCS found in WHPAs in the studied areas of the County, and consequently have been given the most significant risk ranking. Some PCSs include gasoline, diesel fuel, motor oil and other volatile organic compounds (VOCs). The persistent nature of these contaminants combined with the inadequacy of disposal practices historically associated with this industry (reflected by active NDEP Bureau of Corrective Actions case files near the Minden Airport and at the Old Saw Mill Industrial Park), has made the effective management of repair garages within WHPAs a high priority. Repair shops are concentrated in the Minden/Gardnerville area, but can be found in WHPAs throughout the county.

3.3.3.2 Septic Systems

While septic systems are not found within every WHPA in Douglas County, in regions where these systems occur, they are numerous and often found in high densities. According to the ISWPP guidance document put forward by NDEP, septic systems are given a risk ranking of moderate to high. This variance in risk rating is based on the wide variety of contaminants which could potentially escape from a septic system, including: synthetic organic compounds, inorganic compounds and microbial agents. In some locations, such as near the East Valley water system's Fairgrounds Well, growing residential neighborhoods lacking central utilities have resulted in an extremely high density of septic tanks. Numerous septic systems in close proximity to sources of drinking water pose a significant risk of contamination.

3.3.3.3 Aboveground Storage Tanks

Numerous Aboveground Storage Tanks (ASTs) are utilized throughout Douglas County, many of which are located in areas which were inaccessible for study. ASTs are commonly used by ranchers and large residences as a short-term storage solution for kerosene, gasoline and diesel fuel. Because these tanks are often found in open, unpaved areas, fuel spills can lead directly to soil and aquifer contamination.

3.3.3.4 Underground Storage Tanks

Several USTs are found within WHPAs in Douglas County and are generally associated with gas stations. USTs in the valley are typically used for the storage of VOCs such as diesel fuel or gasoline, although many have been abandoned. USTs represent a direct threat to ground water because they have been partially buried and leaking material is released directly into the vadose zone (in general, this zone extends downward, from land surface to the groundwater table). However, regulations require that USTs be registered and undergo rigorous monitoring, which helps to mitigate the associated risk. Regardless of regulations elsewhere, USTs must be properly inspected and managed to prevent accidental release and long term damage to the aquifer.

3.3.3.5 Private Wells

The historic absence of central utilities in many parts of the Douglas County has led to the development of a vast number of private wells in the region. Although small, these wells often share the same aquifer as PWSs and can provide a direct conduit for contamination to enter the ground water system if they have not been properly installed, maintained or abandoned. The location of every private well in the County is beyond the scope of this program; however, the office of the State Engineer and the BSDW can be contacted for additional information relevant to specific locations. Douglas County recognizes private wells are a concern and strongly encourages private well owners to implement protective management strategies near their wells similar to the ones recommended in this CWHP Plan for PWS wells.

3.4 County-Wide Management Strategies

Based on the results of the contaminant source survey, the CWHP Team developed a strategy to manage PCSs in the community and a schedule for implementing this strategy. As new projects are proposed and are processed through the Plan review process, information about each project located within a WHPA will be forwarded for review and comment by the PWS associated with that WHPA. PWS comments will be compiled by the Planning Department and included in the Conditions of Approval for the project. The Douglas County Planning Commission and the BOCC review, approve, or deny projects as required by Title 20, the Douglas County Master Plan, and NRS as applicable.

In its capacity as Emergency Manager, the EFFPD interacts with PWS Operators to facilitate the continuous supply of safe drinking water to the residents of Douglas County during emergency situations. The EFFPD has a plan review process for most potentially hazardous projects, with the exception of agricultural chemical storage, to help identify potential hazards, including those that could present a potential contaminant risk to ground water.

The EFFPD website lists projects that qualify for plan review as those including:

- New Construction
- Automatic Fire Extinguishing System
- Fuel Tank
- Sub-division Map
- Proposed Development
- Tenant Improvement
- Fire Sprinkler System

- Fire Alarm System
- Utilities
- Excavation and Grading

Douglas County does not issue business licenses; individuals and other entities operating in the state of Nevada under an assumed or fictitious name or designation must file with the County. The County can identify PCSs when they provide information regarding the type of business to be conducted (as required through the fictitious name, or provided on a voluntary basis), or when they fall under the purview of the Douglas County plan/permit process, or other State and federal reporting requirements. There are approximately 59 companies in Douglas County currently subject to State Fire Marshal, NDEP, or federal regulations governing the management of hazardous materials.

Table 3 (page 22) discusses generalized regulatory and non-regulatory management strategies for use throughout the County, to address general threats associated with local contamination. Possible management approaches for specific types of PCSs are provided in Table 4 (page 23).

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Table 3. Management Tools and Strategies

Regulatory	Management Tools	Applicability to the Douglas County CWHP Plan
Zoning Ordinances	Comprehensive land use requirements designed to direct the development of an area where certain land uses may be restricted or regulated in WHPAs. One of the most powerful tools for managing future contamination events that could impact underground sources of drinking water.	As new projects are proposed and are processed through the Plan review process, information about each project located within a WHPA will be forwarded for review and comment by the PWS associated with that WHPA. PWS comments will be compiled by the Planning Department and included in the Conditions of Approval for the project. The Douglas County Planning Commission and the Board of County Commissioners review, approve, or deny projects as required by Title 20, the Douglas County Master Plan, and NRS as applicable.
Source Prohibitions	Regulations that prohibit the presence or use of chemicals or hazardous activities within a given area. Local governments will use restrictions on the storage or handling of large quantities of hazardous materials within a WHPA to reduce or eliminate the threat of contamination.	
Special Use Permits	Regulations which provide for specific exceptions to general land use ordinances.	
Subdivision Ordinances	Community adopted subdivision rules and regulations to regulate road drainage/runoff in subdivisions within WHPAs. Used to ensure subdivision road drainage is directed outside of WHPAs.	Future development projects will be evaluated by the applicable PWS to ensure compatibility with the WHPAs.
Operating Standards	Regulations that apply to ongoing land use activities to promote safety or environmental protection. Such standards can minimize the threat to the WHPA from ongoing activities such as the application of agricultural pesticides or the storage and use of hazardous substances.	Douglas County is reviewing existing ordinances for their applicability to the CWHP Plan.
Non-Regulatory	Management Tools	Applicability to the Douglas County CWHP Plan
Ground water Monitoring	A program which consists of regular sampling of wells for contaminants. It helps the community measure the effectiveness of its source controls and compliance with drinking water standards.	Water supply wells are routinely monitored in accordance with state requirements. More rigorous monitoring can be required by PWSs as a Condition of Approval for projects proposed within Douglas County or local communities in high risk locations.
Local Business Owner Education	Encourage local business owners to take advantage of the Business Environmental Program offered by Nevada Small Business Development Center (NSBDC).	Local business owner education regarding the implementation of the CWHP Plan and the need for WHPAs is critical to the success of the program.
Household Hazardous Waste (HHW) Collection	A good management tool to reduce the amount of hazardous waste going to the landfill or septic systems. Coordinate with local government to implement a HHW Collection Day. This option helps to educate the public about the types of household products which are toxic or hazardous. It encourages public involvement. Educate the citizens in your community by distributing NDEP's flyer about Safer Alternatives to Hazardous Household Products.	Douglas County has an active HHW program in place, but additional education regarding the program days and conditions is recommended.
Public Education	Public education is a key aspect of any WHP Program. Public education efforts are important in building public support for regulatory changes and local funding. NDEP has prepared a flyer listing the available sources for getting ground water protection related public education materials.	Public education through the public school system is appropriate and the Education and Outreach Sub Team has created tools to begin this process (reference Appendix H). Implementation assistance is needed to circulate educational materials.

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Table 4. Management Approaches for Potential Sources of Contamination

Contaminant Sources	Suggested Management Approach	Applicability to the CWHP Plan
Auto Salvage Yards	Automotive fluids should be properly collected, contained and disposed of according to local regulations. Monitor activities near WHPA to detect violations. Encourage recycling and take advantage of NDEP's recycling program by calling Nevada Recycling Hotline (1-800-597-5865).	Salvage yards were located within the Douglas County WHPAs. Property owners may need specific information to manage the materials they store.
Abandoned/Orphaned Water Wells	Poorly constructed wells and improperly abandoned wells can act as a 'direct route' for ground water contamination. State regulations require proper plugging of water wells. Educate the citizens in your community by distributing NDEP's Abandoning Unused Water Wells fact sheets.	Several wells are abandoned, proposed for abandonment, or inactive within existing WHPAs. The CWHP Team may want to identify either specific wells or perform an inventory of orphaned wells as a goal of this CWHP Plan.
Illegal Dumping	Monitor WHPAs to detect illegal dumping. Use Nevada's Recycling Hotline (1-800-597-5865) to report illegal dumping.	Illegal dumping is a challenge throughout Nevada. Education and outreach materials, combined with enforcement of nuisance ordinances generally assist in preventing this practice.
Accidental Spills	Monitor WHPAs for accidental spills. Have an emergency response/contingency plan ready if an accidental event threatens the water supply.	Emergency response plans are in place and the EFFPD has requested enhanced coordination with the CWHP Team to obtain WHPA information and updates through Douglas County's internal GIS.
USTs / Home Heating Oil Tanks	All USTs and home heating oil tanks should be monitored and tested according to the requirements of NDEP. Leaking tanks should be removed as soon as possible and corrective actions should be taken for site remediation. Coordinate with NDEP for financial assistance from the State Petroleum Fund. Educate the citizens in the community by distributing NDEP's Home Heating Oil Tanks fact sheets.	This approach is appropriate and should be implemented when funding can be obtained.
ASTs	Coordinate with local Fire Department and utility purveyors about siting and construction of ASTs, and reporting spills to appropriate PWS representatives.	This approach is appropriate and should be implemented when funding can be obtained.
Septic Systems	Proper design, construction and maintenance of septic systems are vital for your water quality. It is important not to dispose of common household hazardous materials into your septic system. Educate the citizens in your community by distributing NDEP's Domestic Septic Systems fact sheets.	Educational materials will be made available as part of CWHP Plan implementation. Additionally, where practicable and when financially feasible, areas with high concentrations of septic tanks will be converted to sewer systems with associated wastewater treatment plants.
Chemical Storage Facilities	Avoid storage or use of chemicals/hazardous materials within WHPAs. Storage and transportation of chemicals/hazardous materials should comply with all applicable laws.	At a minimum, education efforts aimed at business owners and residents within WHPAs should be conducted.

3.5 Contingency Plan

Contingency Plans differ from the Emergency Response Plan required by the Bureau of Safe Drinking Water (BSDW) for PWS Operators, as they are intended to provide a long term course of action in the event drinking water resources for a community become contaminated. Contingency plans are provided in each of the five approved WHP Plans previously developed for PWS in Douglas County, referenced in Table 1 (page 3) and in Section 6 of this CWHP Plan.

Emergency Response Plans are typically short term solutions in response to an immediate shut-down of a water supply, either related to mechanical issues, water quantity problems, or in response to a contamination threat or natural disaster. However, emergency response plans do not address the longer term problems associated with contaminated aquifers.

Contingency Plans, within the context of the ISWPP, are built on Emergency Response Plans and provide guidance and direction to the local community and PWSs in the event the aquifer or main source of drinking water is significantly contaminated. The Contingency Plan should demonstrate the community's planning capacity to address a long-term emergency situation. Some considerations include assessing the time frame needed for the community to switch to an alternate source, the capacity and quality of water alternate sources may provide, and what local resources are currently available to implement the use of an alternate source. Contingency plans could also include conservation measures intended to prolong the use and availability of water supplies (e.g., during periods of interim decision making, remediation, or new source development).

The Contingency Plan reviews potential contaminant scenarios and measures to address that contamination, either through treatment or the development of a new water source. Information in the Contingency Plan can include, but is not limited to:

- Emergency contact list
- List of individuals and their responsibilities
- Description of possible primary contingencies and emergencies
- Short and long-term water treatment options
- Long term drinking water source replacement, augmentation or remediation
- Cost/Benefit analysis for possible actions

3.5.1 Short-Term Emergencies

Short-term emergencies are transient events which prevent the availability of drinking water in a community for a limited period of time and are described in the existing Emergency Response, Water Conservation and Emergency Management Plans for the respective area. A list of potential alternate supply options is included below; however, the emergency water supply options listed here are not intended to provide permanent solutions for the affected community.

Existing System Sources: Few of the two-year TOTs in the County overlap, which suggests a contamination event for one well may allow for isolation of other wells within the same system. These wells may provide a temporary backup source of drinking water for users in the system, depending on the extent of contamination; however, many PWS in the County contain only one drinking water source.

Stored Water Reserves: Douglas County Utilities maintains a reserve of treated water in storage approximately equal to one average day's use.

Boil Order: A boil order may be issued at the discretion of the Manager of Douglas County Utilities or as directed by the BSDW.

Bottled Water: Bottled water is sold in the region at numerous local outlets and can be trucked in from outside regions as part of a relief effort.

Potable Water Trucks: Similar to bottled water, potable water trucks may be brought in from unaffected communities, such as Carson City.

Local Emergency Agreements: Many water systems in Douglas County are interconnected through a series of intersystem connections or interties. Emergency agreements exist between communities which will facilitate cooperation during a local emergency. Additional information about interties can be found in section 3.5.2.

Conservation: Conservation measures are long-term steps taken when demand may exceed availability. For example, limiting the watering of lawns during a period of severe drought would be a conservation measure. Ration orders may be given if demand cannot be met by some other means. Rationing and conservation are outlined in the Douglas County Water Conservation Plan.

Douglas County highlighted the availability of backup generators should the existing pumping facilities become inoperable. Minden and Gardnerville also state the use of alternative wells outside of another well's two year protection (TOT) zone as a planned contingency.

3.5.2 Long-Term Contingencies

In the event of significant contamination of a drinking water source, the region may find itself subject to a long-term deficit in its water supply, which will have to be supplemented by either a new source or an agreement with another water system. Recently, interties have been developed, or are being developed, which link multiple PWSs together. These interties and associated cross connection agreements could be used if one of the town's water supplies became insufficient or compromised for any reason. Current and planned interties include:

- The Town of Minden – Gardnerville Water Company
- The Town of Minden – East Valley Water System (Douglas County Utilities)
- Indian Hills GID – North County Water System (Douglas County Utilities)
- Indian Hills GID – Ridgeview Estates GID
- North County Water System (Douglas County Utilities) – Carson City Public Works
- North County Water System (Douglas County Utilities) – Sierra Estates GID

Douglas County is considering water system expansion, to stabilize the water supply (from both a quantitative and qualitative perspective) and may be looking at supplying water to other systems within and adjacent to the County. As such, a better understanding of these water systems and their potential influence upon one another is critical at this time, for planning purposes.

3.6 New Sources

All new drinking water sources and related drilling activities are regulated by the Nevada Division of Water Resources (NDWR) as specified in the Nevada Administrative Code (NAC) 534.010-534.450. Prior to the initiation of drilling, a notice of intent must be on file with the NDWR and a permit must be obtained to drill or replace a water well within a hydrologic basin designated by the State Engineer. Water quality studies must also be performed to determine if the parameters are below the maximum contaminant levels for drinking water established by the EPA and the State of Nevada.

According to the BSDW, the horizontal distance between a supply of water and any potential source of pollution must be “as great as is practical, but no less than one hundred feet”. While this statute is supportive of the CWHP Plan, a distance of 100 feet is generally inadequate for source water protection and does not change the necessity of WHPA delineations for new sources under this plan.

Should Douglas County or any of the PWSs choose to develop or acquire a new public water supply source, the proposed source will be evaluated by the CWHP Team (with respect to the guidelines outlined in this document for all the CWHP Plan elements) before it will be incorporated in the CWHP Plan. A WHPA will be delineated for the proposed water source and will then be inventoried for PCSs before construction or incorporation of the new source. The WHPA will be managed in accordance with the goals stated in this CWHP Plan; however, management strategies may be modified for the new source or implemented in their current state, where appropriate.

It is up to the individual water purveyors to select source development strategies and applicable elements.

Table 5 (page 27) discusses the processes for the development on new water supply wells.

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Table 5. Possible Source Development Plan Elements for New Water Supply Wells

Element	Considerations	Potential Application
Identify Undeveloped Water Sources	Suitable sites exist for future water supply well.	Suitable areas identified for additional water supply wells to augment or replace existing sources, but alternatives, such as existing wells that may be rendered redundant by the intertie projects should be evaluated for future use.
Examine Steps Required to Obtain Water Rights	The systems have adequate water rights to provide for future buildouts.	Change in point of diversion would have to be filed with NDWR after final well site selection.
Define WHPAs for New Well Sites	Site-specific data will not be available but existing data for region as a whole is considered adequate.	Deferred to final well location selection. Adequate information already exists for delineation of preliminary WHPA through AFR, such as for the Sawmill well. Final delineation will be based on results of well pump tests.
Identify PCSs	Contaminant inventories for proposed new wells should be completed prior to siting the well to promote advanced planning for the protection of these water supplies..	The PWS may not want to site wells in areas with high concentrations of PCSs or in areas with known contamination issues.
Select Management Strategies and Options	Source reviews have been identified for WHPAs to be implemented during the design/plan review process.	Public education program to continue. County Commission approvals needed prior to incorporation of the CWHP Plan and associated WHPAs into the Master Plan Amendment Update and associated design/plan review processes.
Perform Compliance Studies	Obtain permits and access and file environmental documentation. Can cost \$5K to \$50K depending on location and National Environmental Policy Act (NEPA) requirements. Sample water and test for chemical constituents to demonstrate compliance with Safe Drinking Water Act. Costs can approach \$5K per source for sampling, analyses, reporting, and contractor fees. Conduct aquifer test of new source well.	Permitting, rights-of-way and NEPA documentation initiated after funds secured. Sampling is typically done following well completion and development or during drilling of a pilot borehole. Will include Safe Drinking Water Act parameters for chemistry. Aquifer test needed for final WHPA delineation; to be done at time of well completion.
Evaluate Financial Needs and Procure Funding	Ten-year planning horizon. Priority needs are evaluation of existing, inactive wells to determine their potential for future use as potable water source wells. Second priority is development of new ground water source or sources over five to ten-year timeframe (\$200K+).	Potential funding sources identified for monitoring wells and grant proposals will be prepared. Funding sources for new supply wells will be sought.
Interconnect Water Systems	Many systems have been or are in the process of being interconnected. Continue that process and analyze the costs and benefits of additional interconnection.	Further interconnection may require additional agreements between PWSs and infrastructure improvements/extensions. Funding sources to be identified for additional interconnections.

3.6.1 Projected Supply Required

Determining the projected supply required from a new source or sources will greatly aid in determining the possible location of those sources.

3.6.2 Protection Areas

3.6.2.1 Contaminant Source Inventory

A supplemental CSI should be conducted prior to construction of a new well or water source to avoid construction in a contaminated area or an area which may become contaminated within a short time frame.

3.6.2.2 Contaminant Management Strategy Development

The preparation of the CSI will facilitate early development of a strategy for managing contaminants in the area of the new source.

SECTION 4: PLAN IMPLEMENTATION

4.1 Master Planning Goals

The Douglas County Master Plan establishes policies intended to address County-wide service and infrastructure related issues. Expansion of potable water systems provided by Douglas County and PWSs in the region, for both domestic and commercial use, is critical for continued development in the County and the expansion of communities in the County. By locating intensive land uses in areas with existing water systems, service can be provided at a lower cost and with significantly less impact than in areas requiring new extensions. For this reason, the Douglas County Master Plan is intended to coordinate land use planning with provisions for these services. This is done through the designation of Urban and Rural Development Areas as a means of identifying geographic areas in which particular levels of service will be needed during the planning period. Further, the Master Plan establishes the concept of “adequate public facilities” as a key factor in the planning, review and approval of new development projects.

4.2 Identified Projects

Appendix F summarizes specific action items compiled from previous work plans and new information provided during CWHP Team meetings. The strategies were developed to meet the objectives of the CWHP Plan and to keep the CWHP Plan up to date. Each strategy is provided in order of priority, and prioritization of the strategy is based on current need, available staff, and available budget. In some cases, no budget was identified for the CWHP Plan because other resources are currently being pursued to complete these action items.

4.3 Funding Opportunities

Identifying funding streams for community water projects may be one of the primary hurdles a municipality or unit of local government faces, particularly when Douglas County does not have the revenue to support such projects. In the current economic climate, applying for loans and grants through federal and state programs may be the best option for leveraging the County’s resources in order to bring

projects to fruition. Potential funding sources specific to water projects may include: the Bureau of Reclamation's Water and Energy Efficiency, Rural Water Supply, Water for America, and System Optimization Review programs; the EPA's Advancing Public Health Protection through Water Infrastructure Sustainability, Clean Water State Revolving Fund, and Drinking Water State Revolving Fund programs; United States Department of Agriculture's (USDA's) Water and Waste Disposal and Water, Sewer, and Solid Waste Disposal Management programs; the Federal Emergency Management Agency's Flood Mitigation Assistance; and the State of Nevada's Assembly Bill (AB) 198 Grants. However, as of the date of this Plan, AB 198 Grants were not available due to State Bonding issues.

Douglas County may identify viable funding sources, or combinations of funding sources necessary to support the project activities, through the programs listed above; however, the County may also wish to identify funding sources that may not be specific to water projects but align closely with the proposed activities. Additionally, projects may need to be divided into several phases in order to find appropriate funding mechanisms. Examples of other potentially applicable funding sources include the USDA's Community Facilities Loan and Grant Program and U.S. Department of Housing and Urban Development's Community Development Block Grants. Recognizing project plans may have to be malleable is a major component of ensuring the potential applicability of a variety of funding sources.

Researching funding opportunities can be completed in several different ways. Grants.gov is the premier site for federal funding research. Additionally, state and federal agency websites provide a wealth of information on their specific programs. Private foundations may also be a source of funding, and the Philanthropy News Digest maintains a database of private, philanthropic opportunities which may be applicable to proposed projects.

Another key component of identifying and obtaining funding is building relationships and leveraging resources. Many grants require a cash or in-kind match as well as demonstration of diverse stakeholder involvement. The Douglas County CWHP Team is a prime example of stakeholder commitment, and the relationships developed throughout this process may be beneficial in future funding applications. Matching and community involvement requirements differ widely between each opportunity. Reviewing program guidance, such as funding opportunity announcements (FOAs), Federal Register notices, and frequently asked questions (FAQs), as well as direct communications with the funding agency will prove vital to the success of a grant application.

4.4 Updates

The CWHP Plan should be considered dynamic such that the Team can amend or update them as needed to reflect the growth and changes of the Community. Regularly scheduled reviews of this CWHP Plan by the Team will ensure the document is current and addresses the needs of the Community. Based on the review, the Team may decide to update or amend either a portion of this CWHP Plan or the entire Plan as they see fit. For example, a community's water supply will be exposed to either new or different types of potential contaminants as the community changes. Often, changes in the PCSs will occur more frequently than changes to the WHPAs, Contingency Plans, or Emergency Plans. Therefore, the Team may determine an update to just the CSI and Contaminant Source Management Strategy sections of the CWHP Plan is warranted. Alternatively, changes in other Community planning documents, procedures, or ordinances may warrant updating or amending the CWHP Plan.

The Douglas County Community Team agreed to review this CWHP Plan biennially and provide a recommendation of which section(s) of the CWHP Plan require amending or updating. A template

recommendation is provided in Appendix G. Appendix G also contains templates to guide Team members on inventorying PCSs within their community. Copies of the recommendation signed by the Team Lead will be attached to this CWHP Plan in Appendix I, distributed to other Team members, and submitted to NDEP no later than December 31 for a given year.

SECTION 5: PUBLIC PARTICIPATION

The Public Education Plan is an organized and strategic approach to educate community members and encourage them to take action in protecting their water resources. In this case, taking action refers to changing practices and behaviors which could be detrimental to source waters and to limit some land uses to those compatible with the goals outlined in the Douglas County CWHP Plan. The objective of the Public Education Plan is to present water providers, residents and other stakeholders with a set of tools and tactics that can be used to promote source water protection outreach and education.

The Public Education Plan is organized into three main components: messages, tactics and measurement techniques. The Public Education Plan is designed for two audiences: community members who are public water users, and local sixth-grade students. The message component provides answers to three important questions for source water protection:

1. What is wellhead protection?
2. Why should water be protected at the wellhead?
3. What contaminates the water we drink?

The tactics section makes up the bulk of the Public Education Plan and presents a list of possible methods to disseminate information. Proposed methods for educating the primary audience (local and public water users) range from social media and direct mail to supplying handouts to local real estate offices and the establishment of a Source Water Protector Award issued by the Chamber of Commerce. For the secondary audience (local sixth-graders), a curriculum is included which will supplement the State's science education kit "Dynamic Earth" in which the students will already be learning about ground water protection.

The final component of the Public Education Plan is a system for pre- and post-evaluations for both targeted audience groups. Because effective evaluation is key to determining how any message or tactic is received, instructions for both quantitative and qualitative measuring instruments are included. The Public Education Plan also includes a set of prefabricated surveys for each of the audience groups, which can be adjusted to fit the specific needs of the community. The Public Education Plan is included in Appendix H.

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